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Quotation No: Q1712.SB/S

Mr John Reicks
Mr Frank Mello Ph.D.
Mr Lee Kramer
Mr Robert McClain

Bryan Foods
1 Churchill Road
P.O. Box 1177
West Point
MS 39773

8 November 1995

Dear Sirs,

Further to your recent discussion with our David Howard regarding various cooking and chilling projects, I am pleased to provide the following quotation:

Flash Browning

Following trials at our Ponca City facility, we achieved the following results:

Zone 1	Uphill Heat.	350 deg C
Zone 2	Downhill Heat.	300 deg C

Application of liquid smoke at 25% solution to provide the best results, with a 1 minute dwell in the medium.

The following is a quotation for a machine sized for your requirements.

Unitherm RapidFlow Continuous Convection Oven

Belt Height:	**36"**
Belt Width:	**40"**
Belt Type:	**Flat flex wire belt 3/8" pitch**
Overall Length:	**23' 2" (standard)**
Drive Motor:	**2 Speed geared motor. IP 55 (1.3 Kw)**

Belt Speed Range:	1 minute minimum 1 hour maximum
Circulation Fans:	6 off, stainless steel impeller, (6 x 0.75 Kw) fixed speed. Balanced by Unitherm to provide even heat across entire belt width.
Stem Injection System:	Into cooker chamber. nominally 100 lbs/hour maximum @ 3 bar dry saturated.
Extraction Fan:	Bifurcated 2000 cfm each variable (2 x 0.75 Kw). Standard galvanised finished, optional all stainless steel available. (See notes).
Belt Washer:	High Pressure (25 bar) pump. Adjustable weir plate within washer to regulate water usage/effluent discharge. Pump close coupled to 15 Kw drive motor.
Heating System:	Comprising of 48 x 2 Kw finned incalloy elements per zone. Elements designed to maximise efficient heat transfer (192 Kw total).
Fire Protection System.	Operated by a solid state, approved fire detector (Fenwal). Twin systems, steam at nominally 6 bar to flood the lower chamber and cooking area. Mains water into the oven top canopy. Pressure switches ensures pressure available to allow machine to operate.
General Construction:	All stainless steel AISI 304. Main framework constructed from 1 1/2" RHS. Inner cooking chamber allowed to "free float" for expansion purposes. Height adjustable, self levelling feet fitted. Outer canopies hinged to allow cleaning. During hygiene all belt support rods are easily removed and re-fitted. Fat collection tray in the lower cooker chamber with a 75 mm diameter outfeed pipe to drain/collection system. Baffle plates on circulation fans are removable for hygiene. All pipework with de-mountable fittings to allow for hygiene.
Control Panel:	Stainless steel, NEM A4 with outer clear makrolon cover over the door furniture and controllers. Belt speed controller FUJI inverter with visual display of H, PID temperature controller showing actual temperature, SP, modulation of output, thyristor settings.

Eurotherm solid state thyristor drive module for the heating elements. Normal running mode is @ 30% FLC.

General control gear telemecanique.

Price Delivered and Installed **$250,000**

Delivery Lead Time:

End of December 1995

Installation price is calculated on 2 days with free access to site. Extra installation time, if required will be charged at a flat rate of $45 per hour.

Energy Costs:

The unit has a total power requirement of 220 Kw. Whilst operating under normal loading conditions it will use 80 Kw per hour. Due to the variation in utility costs within the US, we can not calculate actual running costs.

Cooling Tunnel

Post browning, a cooling tunnel to remove surface temperature.

Tunnel Length: 10 ft

Belt Width: 40"

Cooling Medium: Liquid Nitrogen

Construction: All grade 304 stainless steel

Price Delivered **$38,000**

Delivery Lead Time:

End of December 1995

Ham Pasteurisation

We can adopt various approaches to this application as follows:-

Single belt AquaFlow System (40")
Dual Belt AquaFlow System (2 x 40" Parallel)
Multi Tier AquaFlow System

The above systems utilise water as the pasteurisation medium with a dwell of 3 minutes in the cook tank. The chilling system utilises brine.

As an option a multi-tier steamer/water chiller could provide the solution. We estimate a 4-5 minute dwell in steam at 95°C.

Budget Prices on the systems are as follows:

Single Belt AquaFlow:

Pasteuriser	**$148,000**
Brine Chiller	**$159,000**

(Inclusive of twin heat exchanger, pumps & pipework)

Footprint requirements: 65' length
9' Width including pipework

Dual Belt AquaFlow

Pasteuriser (2 x 40" Belts)	**$210,000**
Brine Chiller (2 x 40" Belts)	**$230,000**

Footprint requirements: 38' length
18' width

Multi Tier AquaFlow

(Infeed and outfeed at same end) **$440,000**

Footprint requirements: 38' length
9' width

Multi-Tier Steamer/Brine Chiller

(Infeed and outfeed at same end) $440,000

Footprint requirements: 45' length
9' width

Prices quoted are ex works Ponca City, Oklahoma

Installation is to be charged at $45 per hour with $15 per hour travel allowance.

Delivery Lead Times:

Single Belt AquaFlow by	End of December 1995
Dual Belt AquaFlow by	End of January 1996
Multi Tier AquaFlow by	End of February 1996

Payment Terms:

30% Downpayment with confirmed order
60% After successful on-site inspection at Unitherm - Ponca City
10% Payable 30 days after installation

UNITHERM STANDARD TERMS AND CONDITIONS OF SALE APPLY

I trust that the above information is in line with your requirements, if you have any further questions or require further information, please feel free to contact me.

Yours sincerely,
for **UNITHERM FOOD SYSTEMS**

Simon Brown
SALES DIRECTOR

UNITHERM STAINLESS STEEL LIMITED
BAILEY ROAD,
OFF ASHBURTON ROAD WEST,
TRAFFORD PARK, MANCHESTER M17 1SA
TELEPHONE: 061 848 8954
FACSIMILE: 061 848 8955

A WORLD OF STAINLESS STEEL PRODUCTS

Our Ref: L1970.MP/S

Mr Jim Gaydusek
Unitherm Inc.
1108 West Hartford
Ponca City
74601

14 February 1996

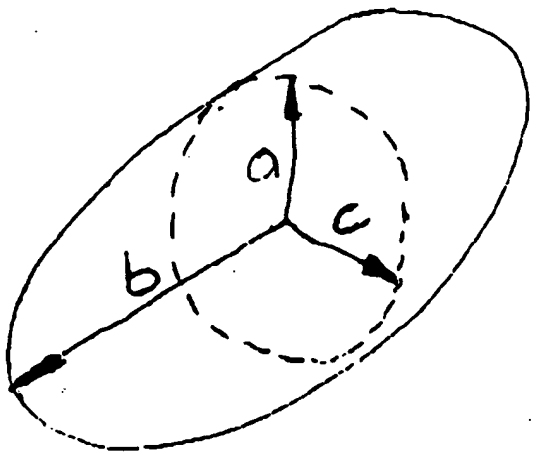
Dear Jim,

Calculations for Prem Singh.

Tested Turkey Crowns in RapidFlow. @ 350°C air up mode and a dwell of 12 minutes.

I found skin temperature of 60°C and back to bulk temperature of 7°C at 40 mm depth.

Therefore assuming joint is an ellipsoid.



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$V = \frac{4 \pi abc}{3}$

Where A = 100 mm (4")
B = 150 mm (6")
C = 75 mm (3")

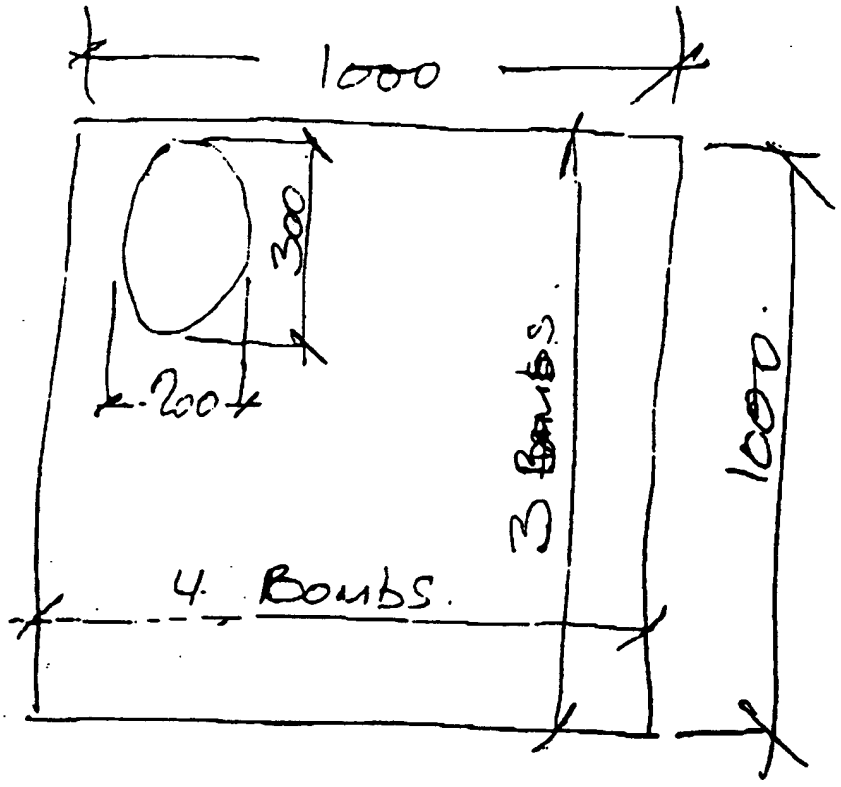
assumed density = 1100 Kg/M³

Mass = Density x Vol

$= \frac{1100 \times 4 \times \pi}{3} \times .1 \times .15 \times .075$

= 5.18 Kg (11.4 lb)

Throughput



IE 12 pieces per square metre

12 x 2.4 = 28.8 in 12 minutes
Length of Tunnel

Therefore $\frac{60}{12} \times 28.8 = 144$ bombs/Hr

Q = MCpDELTA T

Delta T = $\frac{60-7}{2} = 26.5°C$

Cp = 3700 J/KgK

M = $\frac{144}{3600} \times 1100 \times \left(\frac{4\ PI \times 0.1 \times 0.15}{3} \frac{0.075 \cdot 4\ PI \times 0.06 \times 0.11 \times 0.035)}{3}\right)$

= 0.203 Kg/Sec

Therefore Q = 0.203 x 3700 x 26.5
= 19.915 Kw

The bombs would require 20 Kw removing from them @ 144 bombs (11.4 lb) per hour.

We would recommend a dwell time of 36 minutes and two evaporators of 25 Kw each.

Regards,

Mark Parkinson
TECHNICAL DIRECTOR

UNITHERM FOOD SYSTEMS INCORPORATED
108 WEST STAFFORD
PONCA CITY, OKLAHOMA 74601
TELEPHONE: 405-762-0197
FAX: 405-762-0199

A WORLD OF STAINLESS STEEL PRODUCTS

February 20, 1996

Mr. Prem Singh
ARMOUR SWIFT-ECKRICH
PRODUCT DEVELOPMENT LAB
3131 Woodcreek Drive
Downers Grove, IL 60515
Via Fax # 708-512-1124

RE: Quote #251JG

Dear Prem:

As you requested, I am enclosing the following calculations and pricing for the browning and subsequent chilling of about 5,000 pounds per hour of turkey crowns in our RapidFlow Convection Oven. The calculation and pricing information is based on a dwell time of 11-12 minutes and a 1-minute immersion of the product in a liquid smoke bath.

1. Your desire to brown 5,000 lbs per hour calculates to about 500 turkey crowns. At a dwell of 11 minutes, we can change the oven contents 60 minutes / 11 minutes or 5.45 times per hour. Five hundred turkey crowns / 5.45 equals 91.74 turkey crowns per oven change. Using a 40"-wide belt, we can load 5 crowns across; 91.74 / 5 equals 18.35 turkey crowns per oven belt length. If we assume each turkey crown occupies 12" of belt length, it is safe to assume 18' of belt length to satisfy your requirements. This is equal to a two-zone RapidFlow Oven in a 40" belt width. We have previously quoted this oven configuration to you for the sum of $275,000.00. This is our latest version of the RapidFlow, capable of 700° F., fitted with additional safety switches, interlocks, and revisions; it comes with an in-line belt washer.

2. To achieve an application of liquid smoke to the products in the manner that duplicates your testing, we would incorporate an immersion bath into the infeed conveyor. It would be sized to accommodate a 60-second immersion and would handshake properly with the oven. We would build this for $30,000.00.

3. An impingement-style chiller would be the most effective long-term means of removing the energy absorbed in the browning process. There is no doubt that the cost-per-pound savings in impingement chilling vs. cryogenics is enormous when you consider the throughputs that you are running.

We have tested turkey crowns in the RapidFlow @ 350° C., and a dwell time of 11 minutes. The skin temperature was 60° C., and was back to bulk temperature of 7° C. at a depth of 40mm. We assume the joint is an ellipsoid with dimensions of : a = 100mm, b = 150mm, and c = 75mm; we assume the density is 1000 kg/m^3. Mass = Density x Volume, or (1000 x 4pi x .1 x .15 x .075) / 3 or 4.71 Kg (10.35 lbs).

Q = M Cp. (Delta T); Delta T = (60 - 7) / 2 = 26.5° C.
Cp. = 3700 J / KgK

M = ((500 / 3600) x 1100) x (((4pi x 0.1 x 0.15 x 0.075) / 3) - ((4pi x 0.06 x 0.01 x 0.035) / 3)) or 0.717 Kg / Sec.

Therefore, Q = 0.717 x 3700 x 26.5 = 70.3 kW.

The turkey crowns would require 70 kW removed from them @ 500 crowns (10 lbs) per hour. We would recommend a dwell time of 27 minutes and two evaporators of 50 kW each. Sixty minutes / 27-minute dwell = 2.22 changes per hour. Five hundred crowns per hour / 5 across = 100 crowns in length, 100 / 2.22 changes = 45 feet in length.

We would build this impingement chiller as per the above for the sum of $235,000.00, ammonia-based, exclusive of high side.

Each component would have independent belts so as to isolate each component from the system for proper operation and sanitation.

All pricing is F.O.B. Ponca City, Oklahoma, and is exclusive of any installation. We would provide an engineer for one day of training on the equipment.

Our standard terms are a 30% deposit with a purchase order, 60% upon shipment from our factory, and the remaining 10% within 30 days of installation.

Prem, if you should have any questions, comments, or concerns, please do not hesitate to call on me at the above letterhead telephone number.

Thank you for your support of **Unitherm**.

Sincerely,

James A. Gaydusek
Sales Engineer, Cooking Processes

ARMOUR SWIFT-ECKRICH
3131 WOODCREEK DRIVE
DOWNERS GROVE, IL 60515
Product Development Lab Phone: 708-512-1021 FAX: 708-512-1124

TO: DAVID HOWARD

FROM: PREM SINGH

DATE: 3-6-96

FAX NUMBER: (405) 762-0199

NO. OF PAGES TO FOLLOW: TWO

SHOULD YOU NOT RECEIVE THE COMPLETE TRANSMITTAL, PLEASE CONTACT THE SENDER AT PHONE LISTED ABOVE

COMMENTS:

DAVID,

ATTACHED PAGES ARE FOR YOUR INFORMATION ON LIQ SMOKE VS NATURAL SMOKE PROFILE DIFFERENCES.

Thanks
Prem.

U-04838

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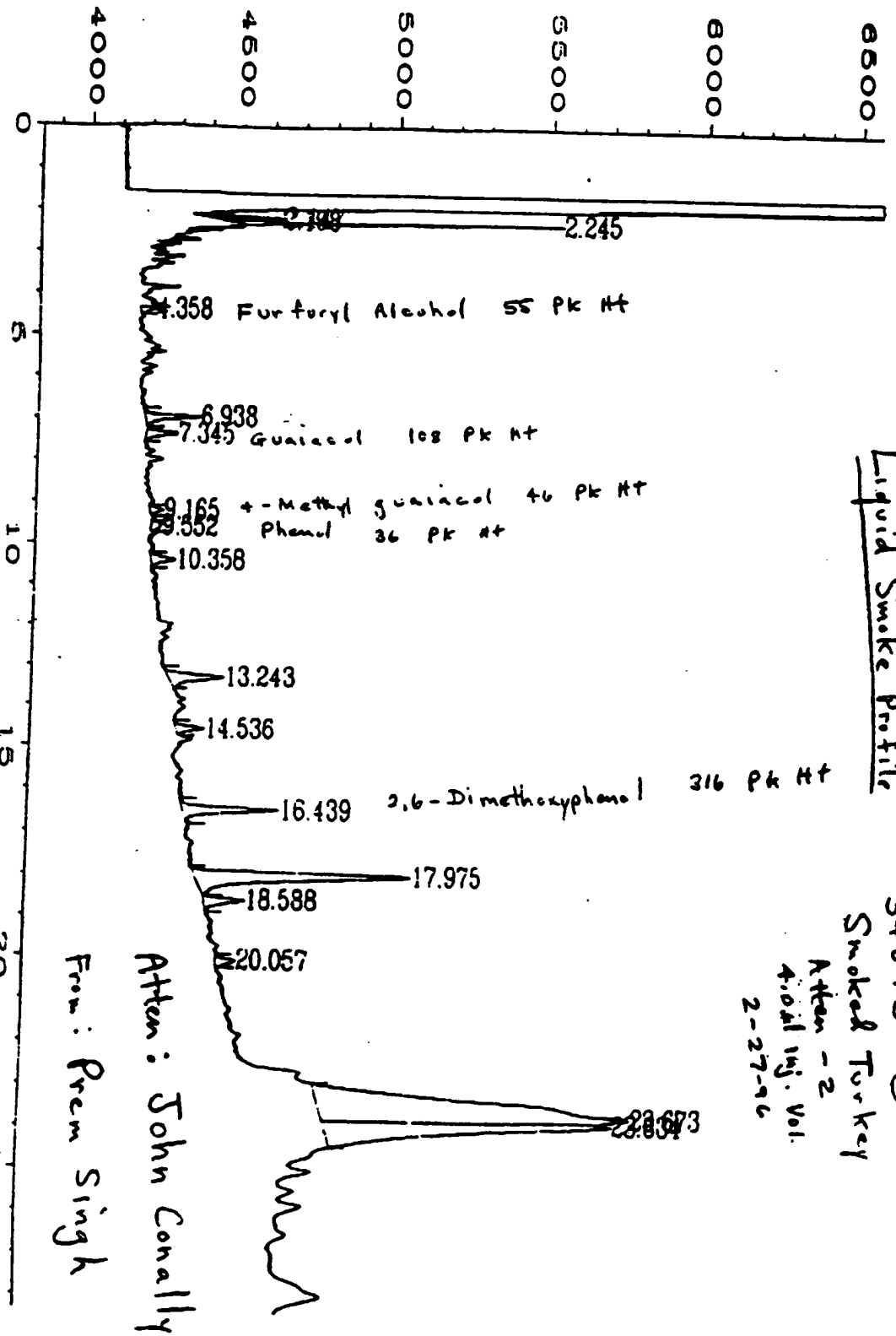
4000
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2.245
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6.938
7.345 Guaiacol 108 Pk Ht
9.165 4-Methyl guaiacol 46 Pk Ht
9.552 Phenol 36 Pk Ht
10.358
13.243
14.536
16.439 2,6-Dimethoxyphenol 316 Pk Ht
17.975
18.588
20.057
23.673
Liquid Smoke Protile
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Atten - 2
4.0ul Inj. Vol.
2-27-96
Atten: John Conally
From: Prem Singh
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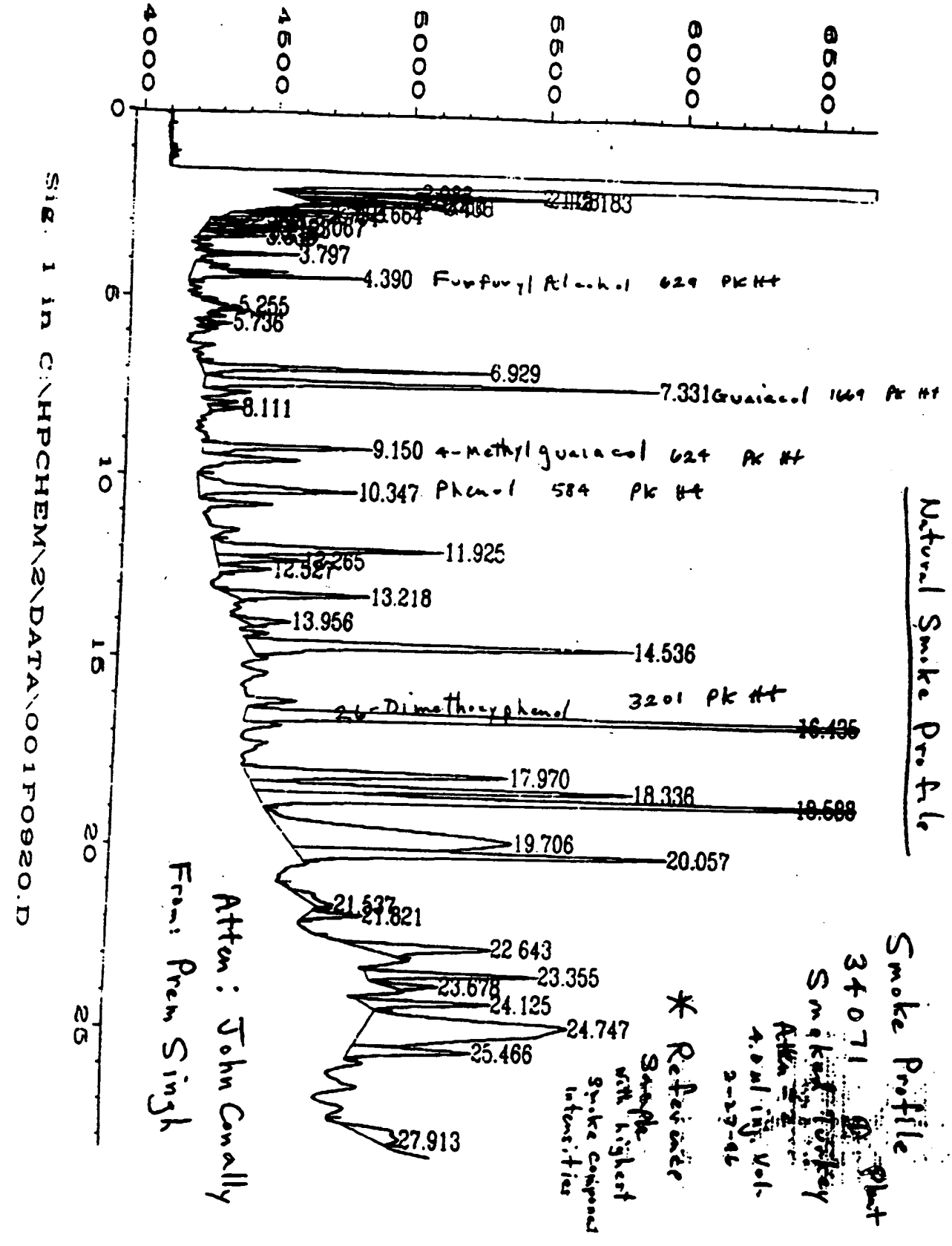

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